G. C. STAEHLE.

CENTERING FOR REINFORCED CONCRETE CONSTRUCTION.

APPLICATION FILED MAY 3, 1915.

1,180,084.

Patented Apr. 18, 1916.

2 SHEETS—SHEET 1.

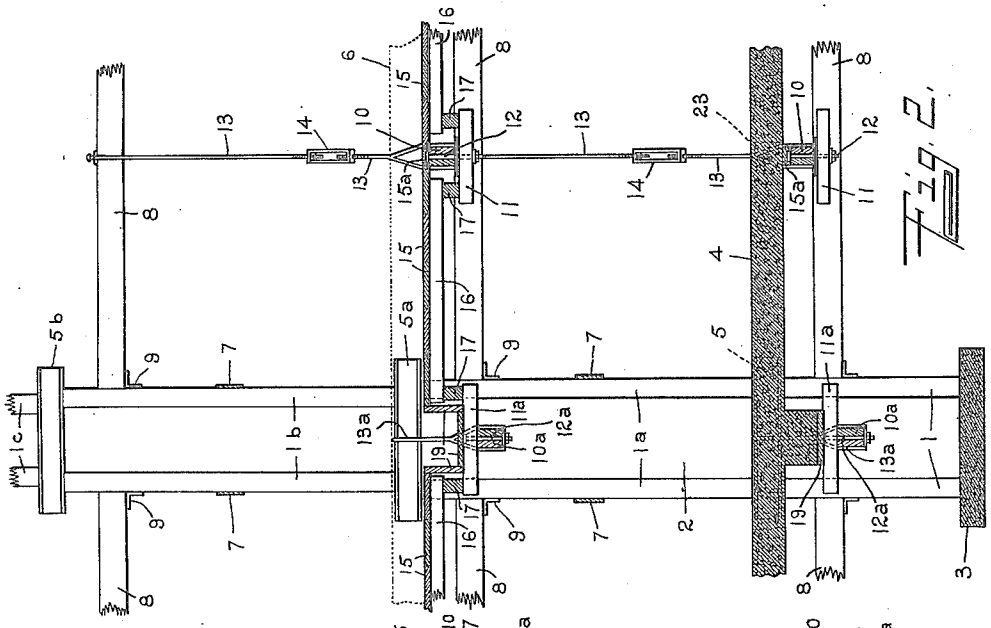


Fig. 2.

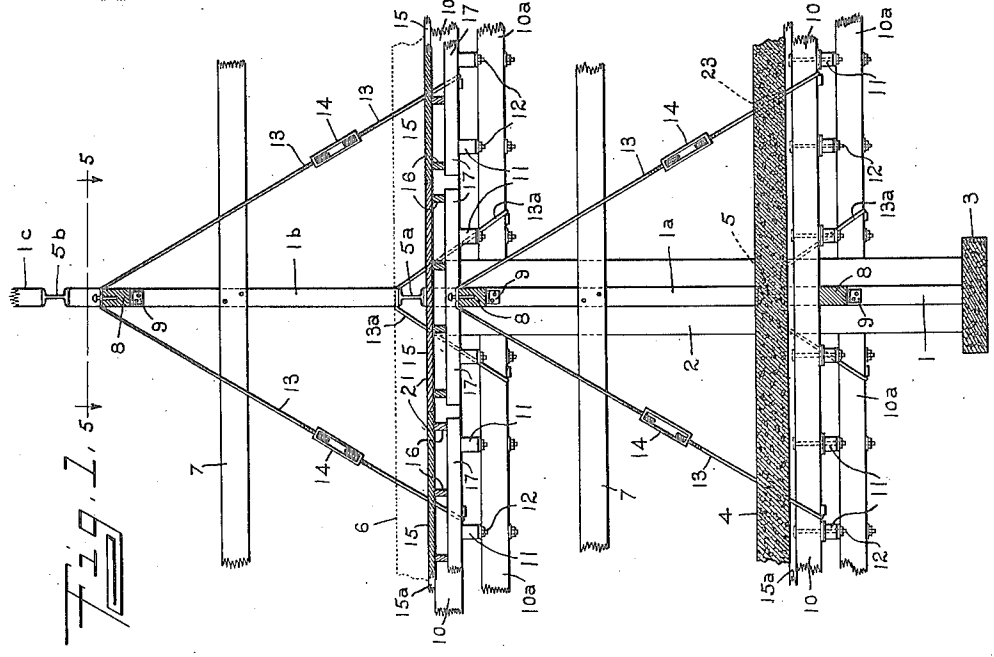


Fig. 1.

Witness

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2 SHEETS—SHEET 2.

Fig. 3.

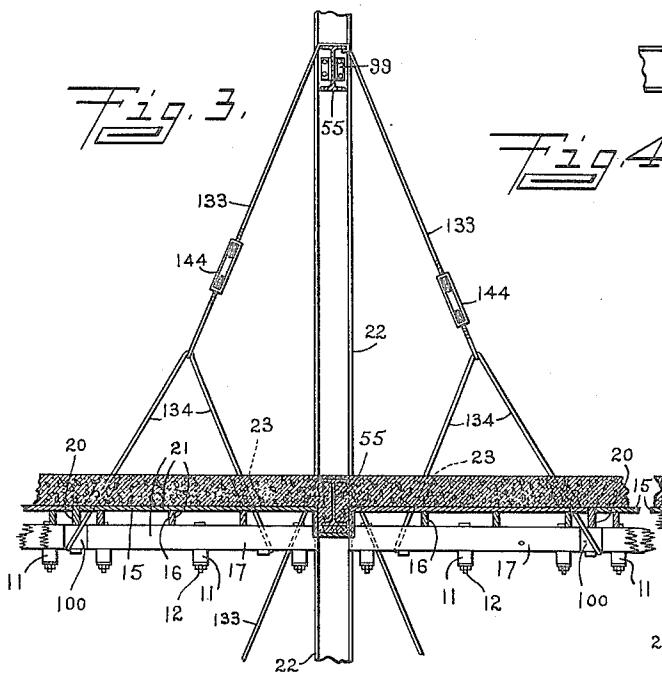
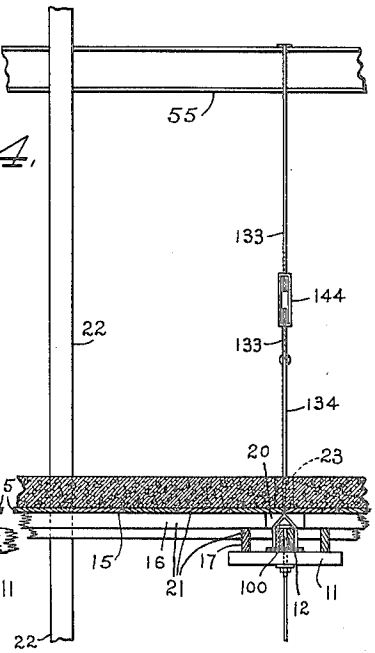


Fig. 4.



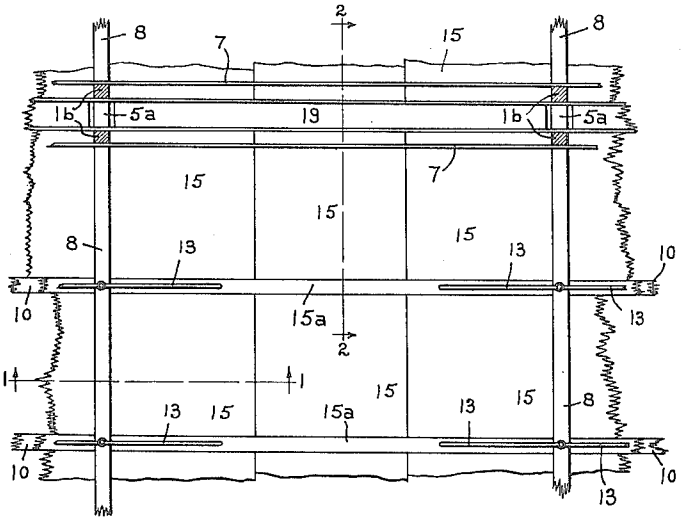


Fig. 5.

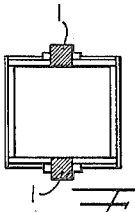


Fig. 6.

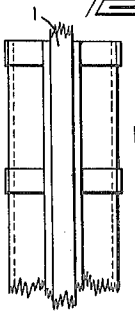


Fig. 7.

Witness

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UNITED STATES PATENT OFFICE.

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CENTERING FOR REINFORCED CONCRETE CONSTRUCTION.

1,180,084. Specification of Letters Patent. Patented Apr. 18, 1916.

Application filed May 3, 1915. Serial No. 25,460.

To all whom it may concern:

Be it known that I, GILBERT C. STAEHLE, a citizen of the United States, residing in Omaha, in Douglas county, in the State of Nebraska, have invented certain new and useful Improvements in Centering for Reinforced Concrete Construction, and have described the same in the following specification, illustrated by the accompanying drawings.

My invention relates to the construction of buildings of reinforced concrete, and in particular to the construction and support of that class of removable false-work, or centering, which is used in erecting such buildings.

It is the object of the invention to mount and support the entire centering system of the building which is in process of construction, upon the footings of the concrete columns, or other ground footings alone, and independently of all concrete flooring; to reduce to a minimum the necessary number of posts used in the support of the centering; to support the floors of the building, while green, by centering members which are suspended from above; to provide means for supporting each floor of the building from the concrete columns alone, and without the aid of posts under the floor; to diminish the quantity of lumber necessary to be used in supporting simultaneously two or more floors of the building which are in different conditions of hardness; to expedite the completion of the building by supporting each higher floor independently of all the floors below it; to allow the lower floors of the building to be finished, covered and partitioned before the upper floors are formed; and in general to produce a superior centering of the specified class and a superior method of constructing buildings of reinforced concrete by the use of that centering.

To accomplish these results I incorporate in my improved centering, as parts thereof, temporary posts contiguous to the concrete columns of the building, a plurality of beams spanning the posts in pairs respectively, and supporting similar pairs above, centering girders supported between columns by the posts, a plurality of stringers resting their ends on the centering girders, tension members connecting each stringer with centering girders above, and a floor platform, supported either mediately or immedately by the stringers.

In the accompanying drawings, illustrating the best manner in which I have contemplated applying the principles of my invention, Figure 1 is a vertical section on the line 1—1 of Fig. 5, showing the centering of the first and second floors of a building of reinforced concrete under construction in accordance with these principles. Fig. 2 is a vertical section of the same on the line 2—2 of Fig. 5. Fig. 3 is a vertical section, corresponding to part of Fig. 1, and showing the invention in a modified form as applied to a concrete building having a steel frame. Fig. 4 is a vertical section, corresponding to a portion of Fig. 2, and showing the same modification, as applied to the same steel construction. Fig. 5 is a horizontal section on the line 5—5 of Fig. 1. Fig. 6 is a horizontal section of one of the concrete column boxes of the same building, with the centering posts contiguous thereto. Fig. 7 is a side elevation of the same.

In the illustrated and unmodified form of my invention, a pair of vertical posts 1 are applied immediately to opposite sides of each of the concrete columns 2. If placed in position before the casting of the columns they form parts of the column boxes 18. These posts are set upon suitable foundations, preferably the column footings 3, and extend to a point slightly above the bottom level of the lower floor 4. Across the top of each pair of posts 1, rests the short beam 5, which is to be embedded in the concrete of the floor 4, and is to support an additional pair of similar posts 1^a, applied to each column 2 in approximate alinement with the posts 1, and extending slightly above the bottom level of the second floor 6 for the like support of the like beam 5^a in that floor. These posts, being preferably timbers approximately six inches square, are continued above the level of each succeeding higher floor in turn by similar extensions 1^b, 1^c etc., and are joined, from column to column between the floors, by the horizontal cleats 7. By these posts, post extensions and transverse beams, a continuous double vertical standard is formed against opposite sides of each of the building columns. The centering girders 8, preferably of timber, extend from post to

post between the columns. They are removably supported on the brackets 9 carried by the posts, and serve to space the latter apart and to brace them snugly against their contacting columns 2 respectively.

A plurality of wooden stringers 10, resting their opposite ends on the centering girders 8, and spanning the distance between them, severally sustain the dependent horizontal brackets 11, which are rotatable on the connecting and sustaining bolts 12, as central vertical pivots. Each of these stringers is attached to two of the centering girders above by tension members which are ties of adjustable length, such as the rods 13, having the turnbuckles 14. These tension members are attached to the stringers at points approximately equidistant from each other and from the ends of the stringer. Additional stringers 10^a, spanning the distance between the concrete columns, are supported at opposite ends by the yokes 13^a, which are dependent from the floor beams 5, 5^a, etc., and on these additional stringers are seated the additional horizontal brackets 11^a, similar to the brackets 11, and rotatable on the vertical pivot bolts 12. These additional stringers support the beam boxes 19, which are of usual construction. The platform 21, on which the flooring concrete is to be poured, consists preferably of a number of panels, or unitary and separable flat structures, comprising severally a portion of decking 15, joists 16, on which that decking is laid, and the ledgers 17 supporting the joists and resting on the pivoted brackets as shown. On each of the stringers 10 is a separable strip of decking 15^a, level with the decking on these panels.

At this point may be explained the manner in which the described centering is used. The centering posts 1 are erected upon the ground footings either before or after the concrete columns are formed, as may be preferred, and are braced and connected by the centering girders as described. One of the steel beams 5 is then laid across the top of each pair of the posts, and parallel to the girders. Then a pair of the extension posts 1^a, are set upright on each of the beams 5, and connected by bracing girders 8, mounted between the pairs as described. Then by means of the tension members, the stringers 10 of the first floor are suspended from the girders above; and the stringers 10^a, from the beams 5. Then the centering panels for the first floor are placed edge to edge on the lower brackets 11 and 11^a; the beam boxes for the first floor are mounted on the lower brackets 11^a; and the column boxes are then or previously erected in the usual manner. Then, after the formation of that portion of the columns which is below the level of the first floor, the concrete is spread upon the lower panels, and forms continuously with the columns, the floor 4, wherein the beams 5 are embedded. Then in like manner one of the steel beams 5^a is laid across the top of each pair of the extension posts 1^a; a pair of extension posts 1^b of the second story are set on each of the beams 5^a; girders 8 are placed between the pairs of posts 1^b; the stringers 10 of the second floor are suspended by tension members from the girders above, and the stringers 10^a of the same floor from the beams 5^a; then the panels for the second floor are hoisted into position, edge to edge on the brackets 11 and 11^a as shown; then the beam boxes for the second floor are mounted on the brackets 11^a, as shown; and then, after the formation of that portion of the columns which is below the level of the second floor, the concrete is poured upon the last-mentioned panels, and forms continuously with the columns the floor 6, wherein the beams 5^a are embedded. And so on repetitiously for each of the higher floors in succession. In the progress of this work the panels on which any lower floor of the building has been cast, may be removed at an early stage in the hardening of that floor, and while the latter is still green, the removal being easily effected upon rotating the brackets through an angle of ninety degrees from the position shown. The removed panels are then immediately available for the formation of another floor above; the weight of the first-mentioned floor being carried to the posts by the stringers, the tension members and the girders, and sustained thereby until that floor is fully cured. When the stringers, girders and posts under any floor are thus removed, the weight of the construction loads above is sustained by the columns alone, being transferred thereto by the steel beams embedded in that floor. To facilitate the removal of the tension members when no longer needed, they are provided with the sleeves 23 in the concrete floors.

In that modification of my invention which is shown in Figs. 3 and 4, the steel column 22 is substituted for the concrete column 2 and for the posts 1, 1^a, etc., which are above described; the beams 55, corresponding to the centering girders 8, are parts of the steel frame of the building, as usually constructed, and are to form parts of the floor 6 and the next floor above respectively; the described stringers 10^a, yokes 13^a, brackets 11^a, and pivot bolts 12^a, are omitted; the described brackets 11, pivot bolts 12, decking 15, joists 16^a and ledgers 17 are retained; for the decking strip 15^a is substituted the wooden beam 20, spanning the stringers as a simple beam which separates from each other the adjacent panels 15, and serves as a support for the concrete after the removal of the panels; while the stringers 100, corresponding to the described

stringers 10, are suspended from the beams 55 by tension members comprising the screw rods 133, turnbuckles 144, and rods or cables 134.

I claim—

1. A centering of the specified class, comprising a plurality of panels for the support of a concrete floor during its initial setting, a plurality of brackets adjustable for the support of the panels, a plurality of stringers carrying the brackets, a plurality of tension members suspending the stringers, and means for supporting the tension members on ground footings independently of the floors of the building.

2. A centering of the specified class, comprising a plurality of dependent tension members supported from the ground independently of the building floors, a plurality of stringers suspended by the tension members, a plurality of adjustable brackets carried by the stringers, and a plurality of panels supported on the brackets during the initial setting of a floor on the panels.

3. A centering of the specified class, comprising a plurality of panels for the support of a concrete floor during its initial setting, a plurality of brackets adjustable for the support of the panels, a plurality of stringers carrying the brackets, and a plurality of tension members suspending the stringers and supported from the ground independently of the building floors.

4. A centering of the specified class, comprising a plurality of panels for the support of a concrete floor during its initial setting, a plurality of stringers for the support of that floor while hardening, a plurality of brackets carried by the stringers and adjustable for the support of the panels, and a plurality of tension members suspending the stringers and supported from the ground independently of the building floors.

5. A centering of the specified class, comprising a plurality of removable posts supported by the building columns, a plurality of temporary girders supported by the posts, a plurality of ties dependently attached to the girders, a plurality of stringers suspended by the ties, a plurality of pivoted brackets supported by the stringers, and a plurality of panels supported by the brackets for the support of a concrete floor while setting.

6. A centering of the specified class, comprising a plurality of panels for the support of a floor, girders above the panels, a plurality of ties suspending the panels from the girders, and a plurality of removable posts supported on previously molded portions of the building columns for the temporary support of the girders.

7. A centering of the specified class, comprising a platform consisting of a plurality of separable portions for the support of a floor poured thereon, stringers for the immediate support of portions of the platform, and detachable means suspended from the stringers for the support of other portions of the platform.

8. A centering of the specified class, comprising removable posts supported on beams embedded in the building columns, a platform disposed below said beams and adapted to mold a floor embedding the beams, and means for suspending the platform from the posts.

9. A centering of the specified class, comprising a platform for the support of a floor while soft, a plurality of horizontal stringers located between sections of said platform for the support of the floor while hardening, adjustable means whereby the platform can be removed without removing the stringers, and means for suspending the stringers from supports above the floor.

10. A centering of the specified class, comprising a plurality of vertical standards, a plurality of dependent tension members supported therefrom, and a plurality of platforms suspended by the tension members; each of the standards having a plurality of posts disposed in pairs one above another and a plurality of transverse beams embedded in the floors.

11. A centering of the specified class, comprising a plurality of vertical standards, a plurality of dependent tension members supported therefrom, and a plurality of floor platforms suspended by the tension members; each of the standards having constituent posts located at opposite sides of one of the concrete columns of the building and supporting a crossbeam which is embedded in the floor and column.

12. A centering of the specified class, comprising a platform for the support of a concrete floor thereon while taking its initial set, a plurality of stringers located between sections of said platform for the support of the floor while curing, adjustable means carried by the stringers whereby the platform can be removed without removing the stringers, and a plurality of ties of adjustable length for suspending the stringers from supports above.

13. A centering of the specified class, comprising a platform on which a floor of the building is cast, and means for temporarily suspending the floor from above, when the platform is removed, said means bearing on previously molded portions of the building columns.

14. A centering of the specified class, comprising a plurality of vertical standards, a platform on which the floor is cast, and means for supporting the platform from the standards; each of the standards having a pair of constituent posts located at opposite sides of one of the concrete columns of the

building, and a cross beam which is embedded in the floor and column.

15. A centering of the specified class, comprising a platform, removable posts carried by the building columns and located above the level of the platform, and means for supporting the platform from the posts.

16. A centering of the specified class, comprising removable posts carried by the building columns for suspending one portion of the floor, and separable means, dependent from the first-mentioned means, for suspending another portion of the floor.

17. A centering of the specified class, comprising a platform having removable panels for the support of a floor, stringers supporting the floor independently of the panels, and means for supporting and releasing the panels from the stringers.

18. That improvement in the art of concrete construction which consists in molding a lower portion of the building columns, erecting thereon a plurality of removable posts, suspending a platform from and below the posts, and then molding a floor on the platform so suspended.

19. That improvement in the art of concrete construction which consists in molding a lower portion of the building columns, mounting thereon a plurality of removable posts, suspending from and below the posts a platform having stringers and intermediate panels, molding a floor on the platform, removing the panels while the floor is soft, and supporting the floor by the stringers after the removal of the panels.

20. That improvement in the art of concrete construction which consists in molding a building column with cross-beams extending outwardly therefrom at the floor level, placing removable supports on said cross-beams extending above the floor level, removably suspending a centering below the level of the crossbeams from the supports and molding a floor to embed the cross-beams.

21. That improvement in the art of reinforced concrete construction which consists in temporarily suspending a sectional centering from overhead supports carried by the building columns, molding a floor thereon, thereafter removing certain of those sections while leaving others to longer support the floor, and later removing the remainder of said sections.

22. That improvement in the art of reinforced concrete construction which consists in supporting concrete flooring, while taking its initial set, partly on a centering platform and partly on stringers supporting the platform, and in afterward removing the platform and leaving the floor supported by the stringers while curing.

Witness my signature at Omaha, Nebraska, May 1st, 1915.

GILBERT C. STAEHLE.